Gonadotropin-releasing hormone

Gonadotropin-releasing hormone (GnRH) secretion from GnRH neurons and its modulation by neuropeptides are essential for mammalian reproduction.

Certain predisposing factors can result in pituitary apoplexy and the use of gonadotropin-releasing hormone (GnRH) agonists for prostate cancer (PCa) is one such condition.

Spergel from the Department of Neurosurgery, Yale University School of Medicine, New Haven, CT, USA. reviewed the neuropeptides that have been shown to act directly and that may also act indirectly, on GnRH neurons, the reproduction-related processes with which the neuropeptides may be associated or the physiological information they may convey, as well as their cognate receptors, signaling pathways and roles in the modulation of GnRH neuronal firing, [Ca2+]i, GnRH secretion and reproduction. The review focuses on recent research in mice, which offer the most tractable experimental system for studying mammalian GnRH neurons [1)].

Gonadotropic cells are endocrine cells in the anterior pituitary that produce the gonadotropins, such as the follicle-stimulating hormone (FSH) and luteinizing hormone (LH). Release of FSH and LH by gonadotropes is regulated by gonadotropin-releasing hormone (GnRH) from the hypothalamus.

Gonadotropin-releasing hormone (GnRH), also known as follicle-stimulating hormone–releasing hormone (FSH-RH), luteinizing hormone–releasing hormone (LHRH), gonadoliberin, and luliberin in its endogenous form and as gonadorelin (INN) in its pharmaceutical form, is a releasing hormone responsible for the release of follicle-stimulating hormone (FSH) and luteinizing hormone (LH) from the anterior pituitary.

The peptide belongs to gonadotropin-releasing hormone family. It constitutes the initial step in the hypothalamic–pituitary–gonadal axis.

The hfHypo cells represent a novel tool for in vitro investigations on human GnRH neuron biology. TNFA may directly affect GnRH neuron function by interfering with KISS1R expression and ciliogenesis, thereby impairing kisspeptin signaling [2)].

Chronic gonadotropin-releasing hormone agonist (GnRHa) administration is used where suppression of hypothalamic-pituitary-gonadal axis activity is beneficial, such as steroid-dependent cancers, early onset gender dysphoria, central precocious puberty and as a reversible contraceptive in veterinary medicine. GnRH receptors, however, are expressed outside the reproductive axis, e.g. brain areas such as the hippocampus which is crucial for learning and memory processes. Previous work, using an ovine model, has demonstrated that long-term spatial memory is reduced in adult rams (45 weeks of

age), following peripubertal blockade of GnRH signaling (GnRHa: goserelin acetate), and this was independent of the associated loss of gonadal steroid signaling. The current study investigated whether this effect is reversed after discontinuation of GnRHa-treatment. The results demonstrate that peripubertal GnRHa-treatment suppressed reproductive function in rams, which was restored after cessation of GnRHa-treatment at 44 weeks of age, as indicated by similar testes size (relative to body weight) in both GnRHa-Recovery and Control rams at 81 weeks of age. Rams in which GnRHa-treatment was discontinued (GnRHa-Recovery) had comparable spatial maze traverse times to Controls, during spatial orientation and learning assessments at 85 and 99 weeks of age. Former GnRHa-treatment altered how quickly the rams progressed beyond a specific point in the spatial maze at 83 and 99 weeks of age, and the direction of this effect depended on gonadal steroid exposure, i.e. GnRHa-Recovery rams progressed quicker during breeding season and slower during non-breeding season, compared to Controls. The long-term spatial memory performance of GnRHa-Recovery rams remained reduced ($P<0.05$, 1.5-fold slower) after discontinuation of GnRHa, compared to Controls. This result suggests that the time at which puberty normally occurs may represent a critical period of hippocampal plasticity. Perturbing normal hippocampal formation in this peripubertal period may also have long lasting effects on other brain areas and aspects of cognitive function [3].

1)
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